W. B. HAMMOND.

STEAM GENERATING APPARATUS.

APPLICATION FILED FEB. 15, 1909.

981,081.

Patented Jan. 10, 1911.

Fig. 1.

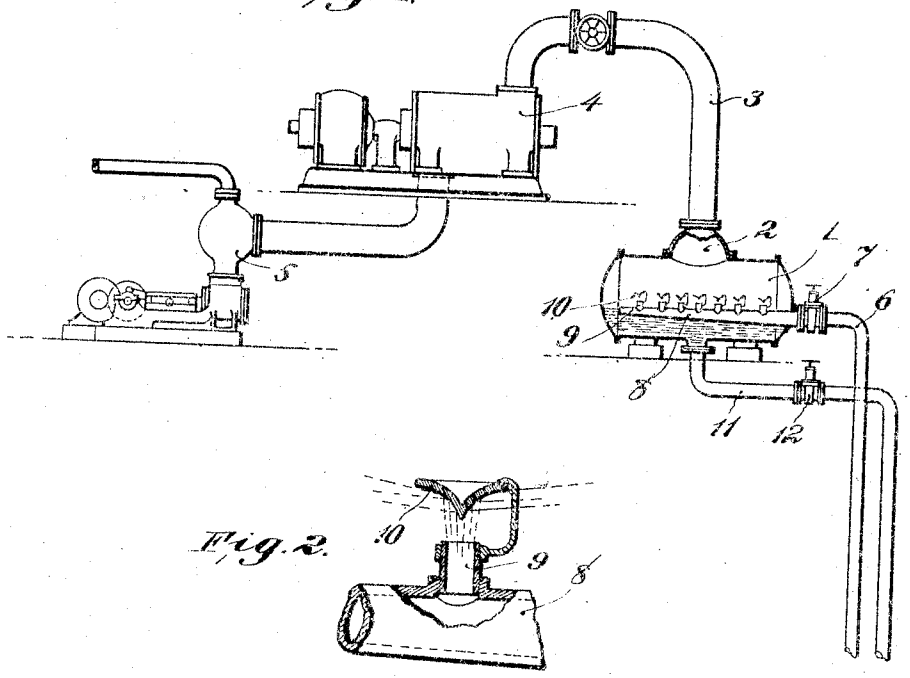
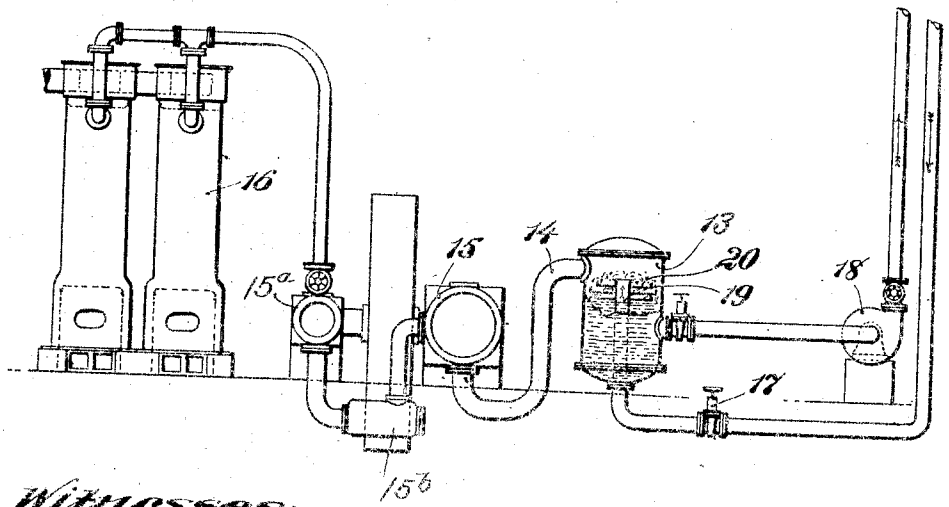


Fig. 2.



Witnesses:

E. C. Wurdeman

K. D. McPhail

Inventor:

Wilberforce B Hammond

by Phillips Van Everen & Fiala

Attys.

UNITED STATES PATENT OFFICE.

WILBERFORCE B. HAMMOND, OF BROOKLINE, MASSACHUSETTS, ASSIGNOR TO GENERAL FIRE EXTINGUISHER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

STEAM-GENERATING APPARATUS.

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To all whom it may concern:

Be it known that I, WILBERFORCE B. HAMMOND, citizen of the United States, residing at Brookline, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Steam-Generating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to an apparatus or system for generating steam, and more particularly to a system in which low pressure steam is generated and utilized to drive a low pressure turbine or other motor for furnishing power.

It is the object of the invention to provide a system or apparatus which will enable water to be used as a means for conveying heat from a point or locality where a heating means is located to a remote point or locality where it is desired that steam be generated. That is to say, it is the object of the invention to provide for locating the heat supplying means and the steam generator at points which are remote from each other, and for conveying the heat from the heating devices to the generator by the circulation of hot water.

To this end the invention contemplates the provision of a steam generator which is supplied with water through a supply pipe leading from a water heating device, and means for returning the water from the generator to the heating device in such manner that the water in the generator is maintained at a proper level for the generation of steam.

The invention contemplates the provision of any suitable form of device for heating the hot water which is supplied to and returns from the generator.

More specifically considered, the invention contemplates the provision of an accumulator or hot water heater by which the exhaust steam from a motor or other steam using device may be utilized to heat the water supplied to the generator, and also contemplates the provision of a motor which may be driven by low pressure steam generated by heating the water to a comparatively low temperature. With this form of apparatus, power may be economically developed in places and under conditions where the economical development of power would be impracticable with the construction and arrangement of steam generating apparatus commonly employed. This form of apparatus also enables the waste heat in the exhausts from various steam using devices to be utilized to generate steam for power or other purposes at points remote from where the exhaust takes place, and enables the transmission from the point of exhaust to the place where the steam is to be utilized to be effected economically and conveniently and with the use of pipes and apparatus of comparatively small size.

Any suitable construction of generator may be employed in practicing the invention, and any suitable means may be employed for causing the circulation of the water through the supply and return pipes between the heater and generator, and any suitable means may be employed for properly regulating the supply and return in accordance with the conditions under which the apparatus is being used.

The various features of the invention will be readily understood from an inspection of the accompanying drawings in which an apparatus embodying the various features of the invention is illustrated diagrammatically.

In these drawings, Figure 1 is a diagrammatic view of the apparatus, and Fig. 2 is a detail showing the manner of discharging the water from the supply pipe into the generator.

As shown in the drawings, the apparatus comprises a steam generator 1 which is provided with a steam dome or chamber 2. The steam chamber of the generator communicates through a pipe 3 with a low pressure motor indicated at 4. As shown, the motor is indicated as a turbine, and is provided with a condenser 5, so that it may act efficiently when supplied with low pressure steam. Water heated to a temperature sufficiently high to generate steam under the low pressure which exists in the upper part of the generator is supplied to the generator through a supply pipe 6, the flow of water through the pipe being controlled by a suitable regulating device which is indicated as a valve 7. The supply pipe connects with

a pipe 8 which extends through the generator, and is provided on its upper side with discharge nozzles 9. The water is discharged through the nozzles 9 against deflectors 10, and is broken up into spray, so that the generation of steam from the water is facilitated. The water which does not pass into steam collects in the lower part of the generator 1. This water is withdrawn through a return pipe 11, the withdrawal of the water being regulated so th t the water in the generator is maintained at the proper level. The flow of water through the return pipe is controlled and regulated by suitable controlling devices indicated as valves 12 and 17 in the apparatus illustrated.

The supply and return pipes connect the generator 1 with a device for heating the water which is supplied to and returned from the generator. The hot water heating device in the apparatus shown is an accumulator 13 constructed to enable the water therein to be heated by exhaust steam supplied through the exhaust pipe 14 of a compound engine comprising the cylinders 15' and 15^a and a receiver 15^b. As shown, the engine is supplied with steam from the boilers 16. The heater 13 is located where the heating of the water may be economically effected, as, for instance, closely adjacent to the engine or other steam using device from which exhaust steam is supplied to it. The generator 1 and motor 4 driven by the steam coming therefrom are located at any point where it is desired to generate power, which point may be remote from the place where the heater is located.

In case the generator is located at a point above the heater, gravity may be depended upon to secure the flow of water through the return pipe 11, the rate of flow being regulated by the valves 12 and 17. In this case, a pump 18 is provided for securing the flow of water from the heater 13 through the supply pipe 6. It will of course be understood that any suitable devices may be utilized for causing the flow of water through the pipe 11 as well as through the pipe 6.

The water which returns through the pipe 11 is discharged from the upper end of a pipe 19 which extends up within the heater or accumulator 13, and this water is brought into intimate contact and mingled with the exhaust steam supplied through the pipe 14. The water discharged through the pipe 19 falls into the upper tray 20 of a series of trays mounted in the accumulator, and flows down through these trays so that its surface is subjected to the steam within the upper part of the accumulator. An effective heating of the water within the accumulator is thus secured. The water within the heater thus accumulates heat from the exhaust steam, and the heated water is transferred to the generator 1 where it will be transformed into steam in accordance with the requirements of the motor 4, the pressure which may be maintained in the generator depending upon the temperature to which the water is heated in the accumulator 13, and the amount of steam required by the motor 4.

Having explained the nature and object of the invention, and described one form of apparatus in which it may be embodied, what I claim is:—

1. A steam generating apparatus, having, in combination, a steam-generator, a device for heating water to the temperature requisite for generating steam in the generator, supply and return pipes for conveying the heated water from the heater to the generator and returning water from the generator to the heater, and means for causing a circulation of the water through the supply and return pipes to maintain the water in the generator at the proper level for the generation of steam whereby the heat requisite for generating the steam is imparted to the water at a point remote from the generator, substantially as described.

2. A steam generating apparatus, having, in combination, a steam generator, an accumulator for heating water, a steam using device, means for delivering the exhaust from said device to the accumulator to maintain the water in the accumulator at the temperature requisite for generating steam in the generator, supply and return pipes for conveying the heated water from the accumulator to the generator and returning water from the generator to the accumulator, and means for causing a circulation through the supply and return pipes to maintain the water in the generator at the proper level for the generating of steam, substantially as described.

3. An apparatus for generating power, having, in combination, a motor, a steam generator for supplying steam thereto, a device for heating water to the temperature requisite for generating steam in the generator, supply and return pipes for conveying the heated water from the heater to the generator and returning the water from the generator to the heater, and means for causing a circulation of the water through the supply and return pipes to maintain the water in the generator at the proper level for the generation of steam, substantially as described.

4. An apparatus for generating power, having, in combination, a motor, a steam generator for supplying steam thereto, an accumulator for heating water, supply and return pipes for conveying water from the accumulator to the generator and returning water to the accumulator, means for causing a circulation through the supply and return pipes to maintain the water in the gen-

erator at the proper level for the generation of steam, a steam using device, and means for delivering the exhaust in the steam using device to the accumulator for maintaining the water in the accumulator at the temperature requisite for generating steam in the generator, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

WILBERFORCE B. HAMMOND.

Witnesses:
IRA L. FISH,
N. D. MCPHAIL.